IN THE SPECIFICATION

Please insert the following paragraph on page 1 after the title of the invention and before the "TECHNICAL FIELD":

--RELATED APPLICATION

This application is a national phase of PCT/JP2005/024145 filed on December 28, 2005, which claims priority from Japanese Application No. 2004-380634 filed December 28, 2004, the disclosures of which Applications are incorporated by reference herein. The benefit of the filing and priority dates of the International and Japanese Applications is respectfully requested.--

The following paragraphs will replace all prior versions of them in the specification of the application.

1) In paragraph [0002], please make the following amendments:

)01]

Polymer electrolyte fuel cells are batteries that generate electricity and heat simultaneously by allowing a fuel gas such as hydrogen and an oxidant gas such as air to electrochemically react with each other on gas diffusion electrodes serving as an anode and a cathode. FIG. ~~22~~ 34 shows a typical structure of such polymer electrolyte fuel cell. As shown in FIG. ~~22~~ 34, a fuel cell 100 comprises at least one unit cell (cell) consisting mainly of a membrane electrode assembly (MEA) 105 and a pair of separator plates for sandwiching the membrane electrode assembly 105, namely, an anode-side separator 106a and a cathode-side separator 106b.

2) In paragraph [0005], please make the following amendments:

)02]

As shown in FIG. ~~22~~ 34, from the viewpoint of disposing gaskets 109a and 109b for preventing gas leakage, the MEA ~~104~~ 105 has a structure in which the main surface of the polymer electrolyte membrane 101 is larger than those of the anode 104a and the cathode 104b, and the entire periphery of the polymer electrolyte membrane 101 extends outwardly beyond the peripheries of the anode 104a and the cathode 104b. In this specification, the periphery of the

polymer electrolyte membrane 101 that extends outwardly beyond the peripheries of the anode 104a and the cathode 104b may sometimes be called "protruding portion" (the letter P in FIG. ~~22~~ 34.

3) In paragraph [0089], please make the following amendments:

3]

In the anode-side separator 6a of each fuel cell 10, one end of the cooling fluid channel 8a is connected to the manifold aperture 16 for supplying cooling fluid, and the other end is connected to the manifold aperture 17 for exhausting cooling fluid. Likewise, in the anode-side separator 6a of each fuel cell, one end of the gas channel 7a is connected to the manifold aperture 14 for supplying fuel gas, and the other end is connected to the manifold aperture 15 for exhausting fuel gas. In the cathode-side separator 6b of each fuel cell 10, one end of the cooling fluid channel 8b is connected to the manifold aperture ~~18 for supplying oxidant gas~~ 16 for supplying cooling fluid, and the other end is connected to the manifold aperture ~~19 for exhausting oxidant gas~~ 17 for exhausting cooling fluid. In the cathode-side separator 6b of each fuel cell, one end of the gas channel 7b is connected to the manifold aperture 18 for supplying oxidant gas, and the other end is connected to the manifold aperture 19 for exhausting oxidant gas.
In other words, the fuel cell 10 of the present invention has a structure called "internal manifold type" in which manifolds are formed in the separators.

4) In paragraph [0101], please make the following amendment:

1]

As shown in FIG. ~~5~~ 10, in the fuel cell stack 30, the cooling fluid channel 8b of the cathode-side separators 6b has the same shape as the cooling fluid channel 8a of the anode-side separator 6a shown in FIG. 2, the entire cooling fluid channel 8a of the anode-side separator 6a and the entire cooling fluid channel 8b of the cathode-side separator 6b disposed between two adjacent MEAs 5 are combined to form a cooling fluid channel 8c. More specifically, the cooling fluid channels 8a and 8b are in a mirror image relationship to each other in the contact face between the anode-side separator 6a and the cathode-side separator 6b. Each cooling fluid channel 8c

shown in FIG. 5 have the same effect on each anode-side separator 6a adjacent to each cooling fluid channel 8c as the cooling fluid channel 8a described above.

5) In paragraph [0103], please make the following amendment:

5]

By disposing the end separator 6C, the cooling fluid channel of the outside separator of the fuel cell 10 disposed at an end of the stack can be used as a cooling fluid channel. When the fuel cell 10 can be cooled sufficiently without the use of the cooling fluid channel of the outside separator of the fuel cell 10 disposed at an end of the stack, the cooling fluid channel (the cooling fluid channel 8e in FIG. 10) for flowing cooling fluid need not be formed. Another end separator having protrusions that fit into the cooling fluid channel of the outside separator of the fuel cell 10 disposed at an end of the stack may be disposed. Alternatively, instead of the end separator 6C, a plate-like separator without a cooling fluid channel (the cooling fluid channel ~~8e~~ 8d in FIG. 10) may be disposed in place of the outside separator of the fuel cell 10 disposed at the end of the stack. The end separator may further function as a current collector plate. Alternatively, a flat end separator without the cooling fluid channel 8e may be disposed in place of the end separator 6C of FIG. 10.

6) In paragraph [0120], please make the following amendment:

6]

In the fuel cell 10, as shown in FIG. 9, in a portion from the manifold aperture 18 for supplying oxidant gas of the ~~anode-side separator 6a~~ cathode-side separator 6b through the cathode-side gap 10b to the electrode, a shield plate 23 is disposed so as to prevent the oxidant gas from flowing directly into the cathode-side gap 10b. The size and shape of this shield plate 23 can be appropriately determined as long as it closes the cathode-side gap 10b in the above portion to effectively prevent the oxidant gas passing through the gas channel 7b from flowing into the cathode-side gap 10a, and as long as the effect of the present invention is not impaired.

7) In paragraph [0121], please make the following amendment:

7]

Accordingly, although not shown in the drawings, the shield plate is also preferably disposed in the junction between the gas channel from the manifold aperture 15 for exhausting fuel gas, the manifold aperture 16 for ~~exhausting fuel gas~~ supplying cooling fluid or the manifold aperture 19 for exhausting oxidant gas and the anode-side gap 10a or the cathode-side gap 10b, respectively. The material for the shield plate is not specifically limited as long as the shield plate is made of a material resistant to permeation and corrosion by the reaction gas. As long as the effect of the present invention is not impaired, an appropriate material can be selected.

8) In paragraph [0129], please make the following amendments:

3]

The anode-side separator 6a and the cathode-side separator 6b are disposed on the outer surfaces of the membrane electrode assembly ~~9~~ 5 as shown in FIG. 1, whereby a fuel cell is formed. Then, a plurality of the fuel cells 10 are stacked to produce a fuel cell stack 30.

9) In paragraph [0130], please make the following amendment:

)]

The anode-side separator 6a and the cathode-side ~~gap 10b~~ separator 6b a can be produced by a conventional method for producing polymer electrolyte fuel cells except for forming the gas channels 7a and 7b, the cooling fluid channels 8a and 8b in the manner as described previously. The constituent material for the separators can be any constituent material for separators for conventional polymer electrolyte fuel cells. The anode-side separator 6a and the cathode-side gap 10b can be formed by, for example, a production method involving a step of machining a conductive flat plate, or a production method (a method involving compression molding technique) involving a step of using a metal mold such as injecting a fluid containing a constituent material into a metal mold, followed by molding process.

10) In paragraph [0147], please make the following amendment:

.0]

That is, to explain more specifically, the gas channel 7a has nine straight portions 77a (long channels) extending in a horizontal direction (a direction substantially parallel to a side of the

anode-side separator 26a where the manifold aperture 15 for exhausting fuel gas and the manifold aperture 18 for supplying oxidant gas are formed), and eight turn portions 77b (short channels) for connecting the ends of each adjacent pair of the straight portions from upstream side to downstream side. The gas channel 7a further has a straight portion 77c (long channel) extending in a vertical direction perpendicular to the horizontal direction which is located at the left side of the electrode area (in the anode-side separator 26a of FIG. 12, the side where the manifold aperture 15 for exhausting fuel gas and the manifold aperture ~~17 for exhausting cooling fluid~~ 19 for exhausting oxidant gas are formed). The gas channel 7a further has, in the upper portion of the electrode area (in the anode-side separator 26a of FIG. 12, the side where the manifold aperture 15 for exhausting fuel gas and the manifold aperture 18 for supplying oxidant gas are formed), a straight portion 77e (long channel) horizontally extending from the straight portion 77c, a most downstream straight portion 77f (long channel) whose one end is connected to the manifold aperture 15 for exhausting fuel gas, and a turn portion 77d (short channel) for connecting the straight portions 77e and 77f from upstream side to down stream side.

11) In paragraph [0153], please make the following amendments:

.1]

Because the cathode-side separator ~~26b~~ 46b has the same structure as the anode-side separator ~~26a~~ 46a, it is apparent that the effect obtained in the anode-side separator 26a described above is similarly obtained in the cathode-side separator 26b.

12) In paragraph [0192], please make the following amendments:

.2]

To explain more specifically, the fuel cells 10A in FIG. 19 have the same structure as the fuel cell 10 in FIG. 1 except that they have an anode-side separator 6A without cooling fluid channel, instead of the anode-side separator 6a of fuel cell 10 in FIG. 1. The end separator 6d in FIG. 19 has the same structure as the end separator ~~6C~~ 6c in FIG. 10 except that the end separator ~~6C~~ 6d does not have the cooling fluid channel 6C.

13) In paragraph [0194], please make the following amendments:

.3]

Even the fuel cell stack 30A in which cooling fluid channels ~~6b~~ 8b are formed only in the cathode-side separators 6b can offer the effect of the present invention described previously. In the fuel cell stack 30A, each cooling fluid channel 6b sufficiently cools both the anode-side separator ~~6a~~ 6A in close contact with the cooling fluid channel 6b and the cathode-side separator 6b.

14) In paragraph [0195], please make the following amendment:

.4]

In other words, in the anode-side separator 6a, there is formed a portion in which the anode-side gap 10a (see FIG. 1) formed between the anode-side gasket 9a (see FIG. 1) and the MEA 5 (see FIG. 1), the "upstream portion" of the cooling fluid channel "~~8b~~ 8a" and the "middle stream portion and subsequent portion" of the fuel gas channel 7a (particularly, the downstream portion in this fuel cell) are formed in proximity to one another to satisfy the conditions (I) and (II) described previously. Thereby, the anode-side gap 10a is filled with condensed water, and therefore the reaction gas is more efficiently used than conventional fuel cells.

15) In paragraph [0200], please make the following amendments:

.5]

To explain more specifically, the fuel cell 10B shown in FIG. 20 has the same structure as the fuel cell 10 shown in FIG. 19 except that the fuel cell 10B has a cathode-side separator ~~6B~~ 6b without the cooling fluid channel in place of the cathode-side separator 6b of the fuel cell ~~10A~~ 30A shown in FIG. 19.

16) In paragraph [0201], please make the following amendments:

.6]

As a specific example of the fuel cell stack 30B shown in FIG. 20 in which four MEAs 5 are stacked, a fuel cell stack 30C having a structure shown in FIG. 21 is given. The fuel cell stack ~~30~~ 30C shown in FIG. 21 is configured by disposing a second fuel cell 10B on the further most fuel cell 10A from the end separator 6e of the fuel cell stack ~~30A~~ 30B shown in FIG. 20 and disposing another end separator ~~6e~~ 6d on the second fuel cell 10B. In this embodiment, a cooling fluid channel (not shown), the same one as the cooling fluid channel of the cathode-side separator 6b of the fuel cell stack ~~30~~ 30C, is formed on the main surface of the anode-side separator 6A in contact with the end separator 6e shown in FIG. 21.

17) In paragraph [0203], please make the following amendments:

.7]

Even when the fuel cell 10B without the cooling fluid channel ~~6b~~ 8b is disposed between the fuel cells 10A having the cooling fluid channels 6b only in the cathode-side separators 6b thereof, the effect of the present invention described previously can be obtained. Specifically, in the fuel cell stack 30B, the two fuel cells 10A as well as the fuel cell 10B disposed between the two fuel cells 10A can be cooled sufficiently by the two cooling fluid channels ~~6b~~ 8b of the two adjacent fuel cells 10A.

18) In paragraph [0220], please make the following amendment:

.8]

In the fuel cell stack according to embodiment 6 having the structure as described above, for example, in the cathode-side separator 6b and the anode-side separator 6A interposed between the fuel cells 10A and 10B, there is formed a portion (e.g., a range including ranges R3 and R4 in FIG. ~~23~~ 22) in which the cathode-side gap 10b formed between the cathode-side gasket 9b and the MEA 5, the anode-side gap 10a formed between the anode-side gasket 9a and the MEA 5, the "upstream portion" of the cooling fluid channel 8b of the cathode-side separator 6b, the "middle stream portion and subsequent portion" (in this fuel cell, particularly downstream portion) of the oxidant gas channel 7b of the cathode-side separator 6b, and the "middle stream

portion and subsequent portion" (in this fuel cell, particularly downstream portion) of the fuel gas channel 7a of the anode-side separator 6A are arranged in proximity to one another to satisfy the conditions (I) and (II). Thereby, the cathode-side gap 10b facing the anode-side separator 6A and the anode-side gap 10a facing the cathode-side separator 6b are filled with the condensed water, and therefore the reaction gas is more effectively utilized than conventional fuel cells.

19) In paragraph [0237], please make the following amendments:

.9]

Specifically, in the case of the fuel cell shown in FIG. 29, the outer edge of the reinforcing film 12 is inserted between the anode-side gasket 9a1 and the protruding portion P of the polymer electrolyte membrane 1, and the inner edge of the reinforcing film 12 is in contact with the catalyst layer 2a. Further, in the case of the fuel cell shown in FIG. 29, the outer edge of the anode-side gasket ~~9a1~~ 9A1 and the outer edge of the protruding portion P of the polymer electrolyte membrane are direct contact with each other. As compared to the fuel cell shown in FIG. 29, in the fuel cell shown in FIG. 30, the reinforcing film 12 inserted between the anode-side gasket ~~9a1~~ 9A2 and the protruding portion P of the polymer electrolyte membrane 1 is extended to the outer edges of the gasket and the protruding portion, and thus the anode-side gasket ~~9a1~~ 9A2 and the protruding portion P of the polymer electrolyte membrane 1 are not in direct contact with each other.